

genitalia in "uncooked" specimen; note genital sacs and peculiar testicular (?) clusters. ♂, 194.01001. S, Left anterior spiracle. ♂, 194.01001. V, Portion of anterior margin of femur of palpus showing toothed falciform setæ and tooth-like granulations. ♀, 194.01003. X, Portion of tergite showing "reticulations." ♂, 194.01006. Y, Portion of sternite showing "reticulations." ♀, 195.01001. AA, Ventral aspect of left palpus. ♀, 194.0— CC, Median maxillary lyrifissure. ♀, 194.01003.

Apocheiridium sp. (possibly *ferumoides*)

G, Galea. ☉, 179.01005.

Apocheiridium mormon sp. nov. ♂, 188.01001.

J, Ventro-lateral aspect of fingers of claw, tactile setæ. P, Coxa of leg I showing internal lateral chitin fold. Q, Ventral aspect of male genitalia. (Considerably distorted due to faulty preparation; should appear more similar to *ferumoides* except for differences shown in x, ml and gl.) Z, Ventral aspect of left palpus.

Structural abbreviations used

Tactile setæ of claw

t, terminal seta; st, sub-terminal seta; sb, sub-basal seta; b, basal seta.

Without letter prefixed indicates movable finger. With a prefix of "e" indicates exterior setæ of fixed finger; with "i," interior setæ of fixed finger.

Setæ of chelicerae

gls, galeal seta; is, interior seta; bs, basal seta; sbs, sub-basal seta; es, exterior seta.

Coxal measurements (A)

l, length; b, breadth; al, accessory length; undesignated line is for the accessory breadth.

Male genitalia

x, X-sac; gl, genital loop; gs, genital sac; tc, testicular clusters; ge, elbow of genital loop pedicel; gp, genital loop pedicel; aap, paired anterior apodeme; ml, median loop; pa, posterior apodeme.

Epygium

mc, median cribriform plate; lc, lateral cribriform plate.

Miscellaneous

ha, humeral angle; cu, cucullus; mx, maxilla; fa, femoral angle; icf, internal lateral chitin fold of coxa I; cml, median maxillary lyrifissure; ml, lamina maxillaris. _____

DOLICHOVESPULA DIABOLICA SAUSS. AND ITS SUPPOSED VARIETY FERNALDI LEWIS

(Hymenoptera, Vespidae)

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A study of the 291 specimens comprised in the collection of Stanford University and that of the author, and to which one or the other of the above names may be applied, has led to the conclusion that they represent but one species which should be known as *Dolichovespula diabolica* Sauss., and which is not

divisible even into varieties. The species was described by H. de Saussure in 1853.¹ *D. d. fernaldi* is a synonym pure and simple.

Individuals of this species having a pair of yellow spots on the propodeum, as differing from the typical form in which the propodeum is entirely black, were in 1897 described by H. W. Lewis as a distinct species under the name *Vespa fernaldi*.² Other slight color differences, such as the presence of more yellow on the abdominal segments and on the legs, were taken account of in the description. Lewis based his description on specimens from Colorado.

Subsequent writers, Cockerell³, Viereck⁴, and Buysson⁵, have considered *fernaldi* as merely a variety of *diabolica*. Buysson says, "Semblable au type, dont elle ne differ que par deux taches jaunes sur le segment mediaire; par la couleur jaune plus abondante sur le pronotum, les pattes et l'abdomen." Buysson had, however, but a single worker, one determined by Lewis and given to Buysson by Fernald.

The color differences noted by these authors have no taxonomic significance whatever, a fact that will be made apparent by the examination of any large series of specimens, for in material from a single locality, or even from a single nest, there may be found specimens showing every conceivable intergradation in color pattern between typical *D. diabolica* and *D. d. fernaldi*. The writer has specimens from thirty localities distributed all the way from Maine to California and from British Columbia to southeastern Colorado, and the only deduction that is justifiable on the basis of this material is that western specimens tend to have more yellow on them than do eastern ones, a feature that is characteristic of many widely ranging species of North American Hymenoptera.

A nest of this species collected at Requa, California, on June 27, 1922, contained 39 workers of which 20 had had the propodeum black, 7 had but a trace of yellow present and 12 had the spots well developed. A nest collected at Dodson, Multnomah County, Oregon, on July 3, 1923, contained 107 workers, 4 males and 3 queens. Of these, 65 workers, 1 male and 2 queens had the propodeum black, 4 workers had a trace of yellow present, and 38 workers, 3 males and 1 queen had the yellow spots more or less well developed. The inhabitants of a third nest, found at Glenbrook, Nevada, on September 12, 1923, showed the

¹Saussure, h. de Etud. fam. Vespides, II:138, 1853.

²Lewis, H. W. Trans. Amer. Ent. Soc. 24:173, 1897.

³Cockerell, T. D. A. Ent. News, 12:40, 1901.

⁴Viereck, H. L. Trans. Amer. Ent. Soc., 29:69, 1903.

⁵Buysson, R. du Ann. Soc. Ent. France, 73:573, 1904.

same condition, though the proportions of the color variations were different. Of 60 specimens, 1 male and 2 workers had the propodeum black, 6 workers possessed just a trace of yellow, and 1 male, 1 queen and 49 workers had the spots developed in greater or less degree.

SPIRACLES AS SOUND PRODUCING ORGANS

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During the summer of 1921, while on a collecting trip in western Texas in company with Professor and Mrs. G. F. Ferris of Stanford University, I took a number of specimens of a large grasshopper which produces a sound by means of its second pair of thoracic spiracles. The hopper has been tentatively determined for me by Mr. J. A. G. Rehn of the Philadelphia Academy of Natural Sciences as *Tæniopoda picticornis*. Mr. Rehn suggests that this may not be the correct name as the species composing the group to which this one belongs are poorly understood and the synonymy much involved.

The sound is of about the intensity of that resulting when two pieces of writing paper are rubbed together and is produced by the spewing out through the second thoracic spiracles of a small quantity of watery liquid at each exhalation. Many tiny bubbles are formed each time the sound is produced. These vary a great deal in number, being at times hardly noticeable and again forming a mass a good three-sixteenths of an inch in diameter. Immediately after being formed the bubbles disappear, leaving an area around the spiracles that is wet for a second or so.

There are no grounds for doubt as to the mechanism by means of which the sound is produced, for in addition to the fact that it is obviously synchronous with the exhalation of air from the tracheæ and the formation of the bubbles noted, it is exactly the sort of sound that one associates with the spewing of a mixture of air and liquid through a small hole, its intensity varies according to the amount of bubbles produced, and the sound ceases entirely when the production of bubbles ceases, as it does shortly (apparently due to a using up of the supply of liquid available) if the hoppers be continuously stimulated for a time. Moreover, the sound may be produced by nymphs as well as adults, thus eliminating the wings as stridulatory organs, and it may be produced even though the legs of the hoppers be held perfectly still. The sound is apparently under full control of the